

INFORMATION BULLETIN

PRIVATE RESIDENTIAL GYPSY MOTH SPRAYING

The Pennsylvania Department of Conservation and Natural Resources, Bureau of Forestry, annually conducts an aerial gypsy moth suppression project for private residential landowners throughout Pennsylvania. This program is conducted and cost shared in cooperation with participating counties or other local municipalities and receives partial funding from the USDA Forest Service. To qualify for this program, your property must meet the following requirements, and you must be willing to assume the responsibilities listed.

OBJECTIVE

DCNR's sole objective under this program is to prevent gypsy moth caused defoliation in treated forest residential areas from exceeding 30% on 80% or more of the highly favored host trees.

Due to the limitations of the insecticides available and the establishment of gypsy moth throughout Pennsylvania, it is not economically feasible or biologically possible to eradicate gypsy moth from any part of the Commonwealth. In addition, the nuisance problem caused by larval gypsy moth populations may not be reduced to the satisfaction of all landowners, even though the foliage protection objective is met.

PROPERTY REQUIREMENTS

Tree Cover – Only forested private residential sites containing trees 25 feet or more in height qualify for this program. These sites must have at least 50 percent of the surface area, when viewed from above, covered by the crowns of these trees. Twenty percent or more of this crown cover must be made up of tree species which are highly favored by the gypsy moth. Highly favored species include apple, aspen, basswood, beech, birches (gray, white, and river), boxelder, hawthorn, larch, oaks (all species), willows, and witch hazel. The site must have a dwelling located within or no more than 200 feet from the forest. The spray block to protect this site will be designed to provide treatment to all forested areas within 500 feet of the dwelling and, in so doing, must include at least 23 acres of forest. The spray block will be designed in this manner to facilitate aerial spraying regardless of how large or small the landowner's property actually is. Spray blocks will not be custom designed to accommodate property boundary lines. Neighboring residential properties where all the landowners desire treatment will be combined into a single block whenever possible.

Residential properties with only scattered ornamental trees and shrubs, private uninhabited woodland tracts, or any property with trees that are readily accessible to ground spray equipment do not qualify for this program. Also, areas that contain any nontarget organisms that would be adversely affected by spraying or areas which are unsafe for aerial spraying because of obstructions or terrain will not be considered.

Egg Mass Density – The proposed treatment areas must contain at least 250 healthy, current-season gypsy moth egg masses per acre or, if there are less than 250 egg masses per acre, there must be a reasonable expectation that high numbers of gypsy moth larvae will be blown into the area next spring. Only areas within one air mile of a heavily infested ridge qualify in the latter respect.

The landowner can measure egg mass density by randomly establishing 1/40-acre circular plots (radius = 18.6 feet) and counting all of the egg masses including those under rocks and those high in the trees (use binoculars). Multiply the plot count by 40 to get the per-acre equivalent. As many egg masses as possible should be touched to ensure that they are from the current season. Egg masses from previous seasons, while often very viable looking in appearance, will feel soft and mushy to the touch. The current-season egg masses should not be removed and destroyed until after December 1 when the cooperator and DCNR field evaluations will be completed.

Areas that have very small egg masses (less than dime size), regardless of the number, often do not qualify for the program because the gypsy moth population will most likely succumb to natural mortality agents shortly after they emerge in the spring.

LANDOWNER RESPONSIBILITIES

Request for Treatment – The private residential landowner with qualifying forest and egg mass density must initiate a request for treatment with the program coordinator designated by the cooperating county—no requests can be made directly through DCNR. This person can be reached by calling the county commissioners' office. Requests must be made from June 1 to July 31 annually (some counties extend this deadline to August 30)—a request must be made each

year the landowner experiences a problem. Adjacent landowners within a qualifying area should get together and submit a united request.

Spray Block Coordinator – To qualify for treatment, one of the landowners within a proposed spray block must agree to serve as the spray block coordinator (SBC). The SBC will be responsible for distributing notification letters to and collecting landowner assessments (see below) from all spray block residents. With some training from DCNR and the cooperator, the SBC will be used to monitor future gypsy moth population buildups and to initiate future requests for treatments in a timely manner.

Landowner Assessments – Many cooperators require the landowners within an approved spray block to pay a per-acre fee which is issued to partially or wholly pay the cooperator's required cost-sharing to DCNR. The total landowner assessment for the block must be paid by the cooperator's deadline or the entire block will be dropped from the program on December 1.

The cooperator will refund a landowner's payment only if the property is dropped from the program because of nonpayment of the total assessment for the block, a neighbor's objection to spraying, or the property does not meet program requirements.

INSECTICIDE

A biological insecticide, *Bacillus thuringiensis* var. *kurstaki*, is the spray material that DCNR will use on private residential lands under this program. DCNR will select the rate of application based upon gypsy moth population density and health with the highest rate used on the heaviest and healthiest populations. Because Bt is a biological insecticide whose effectiveness can be affected by weather conditions during and after application as well as insect population levels, DCNR does not guarantee the degree of control. A second biological insecticide, Gypchek, may be used in cases where Bt is not appropriate because of the presence of lepidopteran species of concern that could be impacted.

LANDOWNER'S CHECKLIST

If you can answer yes to all of these questions, your property can qualify for the Pennsylvania cooperative gypsy moth suppression project.

	YES	NO
Is your county or local municipality cooperating in the cooperative gypsy moth suppression program?	___	___
Does your area contain at least 23 acres of forest with at least 50 percent crown cover made up of at least 20 percent highly favored species?	___	___
Is your house within the forest or no more than 200 feet from it?	___	___
Does your area contain an average of at least 250 healthy egg masses per acre or a reasonable potential for blow-in?	___	___
Have you contacted your neighbors to include their properties in the treatment request?	___	___
Are you or a neighbor willing to serve as a spray block coordinator?	___	___
Are the funds available to pay the entire landowner assessment for the area?	___	___
Was a timely request for treatment made with the program coordinator?	___	___

**COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF CONSERVATION AND NATURAL RESOURCES
BUREAU OF FORESTRY
DIVISION OF FOREST PEST MANAGEMENT
400 Market Street, 6th Floor
Harrisburg, PA 17105-8552**

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Forest Health Factsheet

Gypsy Moth

Gypsy moth, *Lymantria dispar* (L.), is an important pest of hardwoods in the northeastern U.S. since its introduction from Europe to Massachusetts in 1869. It is now established in 19 states from Maine to Wisconsin and extends to northeastern North Carolina. In Pennsylvania it was first discovered in Luzerne and Lackawanna counties in 1932. A total of 4.3 million acres were defoliated in the state during the historical peak year of 1990. Suppression programs have been carried out by the Pennsylvania Bureau of Forestry since 1968 to minimize its impacts on the forests.

Hosts

Gypsy moth is a spring defoliator with more than 300 host species. Oaks, especially white oaks, are preferred by feeding caterpillars. Older larvae will also feed on conifers such as hemlock, pines, spruces and southern white cedar. Non-hosts include ash, yellow-poplar, sycamore, black walnut, catalpa, locust, American holly, and shrubs such as mountain laurel, rhododendron and arborvitae.



Mature larva

Life History

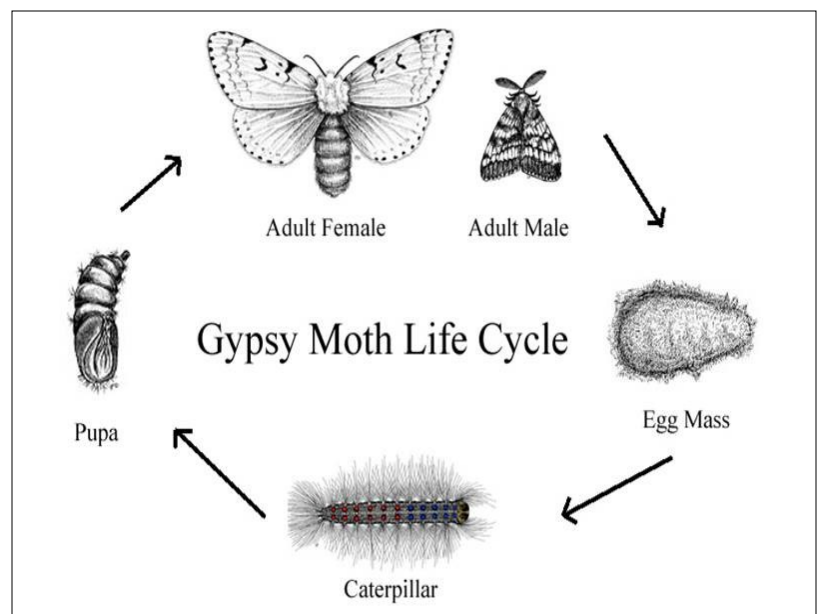
Gypsy moth has one generation per year in Pennsylvania. Females lay their eggs as light tan egg masses (400-600 eggs) on trees, stones and other substrates during July to overwinter. Eggs hatch from late April to early May the following spring. Small 1st instar larvae move in search of suitable food sources by floating in the wind on silken threads. Early instars feed on foliage and remain on hosts, whereas half-grown larvae usually feed in the canopy at night and move down from the tree to seek shelter in bark crevices and other protected sites during the day. Larvae mature by mid-June. Late instars are marked by five pairs of dark blue spots and six pairs of red spots along the back. Pupation takes place in late June or early July in places such as tree trunks, stone surfaces and building exteriors. Adults start to emerge two weeks later and reach peak emergence by mid-July.



Adult female and egg mass

Natural Enemies

Natural enemies (predators, parasitoids, and pathogens) play an important role in regulating gypsy moth populations. Birds, mammals, and predaceous insects such as the Calosoma beetle feed on eggs, larvae and adults. Parasitoids of gypsy moth include *Ooencyrtus kuvanae* for eggs, and *Cotesia melanoscelus* and *Parasetigena agilis* for larvae. There are also two pathogens that greatly affect gypsy moth caterpillars: the nucleopolyhedrosis virus (NPV), and the fungus *Entomophaga maimaiga*. Gypsy moth larvae die of viral infection hanging from trees in an inverted V position; while those killed by the fungus remain mummified head-down on the tree.



Management

The Pennsylvania Bureau of Forestry conducts annual egg mass surveys to monitor gypsy moth populations. A suppression program is planned when populations exceed threshold levels. Treatments are only conducted at the request of the landowner and if the area meets the program requirements. Treatment is applied when 50% of the caterpillars are in their second instar in the spring so timing is critical. If you believe that you have a need for a gypsy moth suppression treatment you should contact your gypsy moth county coordinator during the summer. Contact numbers and additional information on program requirements can be found at the [PA Bureau of Forestry Gypsy Moth Site](#).

Mechanical

Tactics for mechanical removal of gypsy moth egg masses can be effective for individual yard trees but are not effective as a forest-wide control method. Methods include removal of egg masses before they hatch and removal of objects where egg masses can be hidden by females. Another control tactic is wrapping burlap around the trunks of trees where gypsy moth larvae can hide during the day. The larvae hiding under the burlap are then scraped into a can of soapy water, killing the larvae. Sticky tape around the trees can also be used to entrap larvae as they move down the trees to hide during the day.



Burlap wrap

Insecticides

The principal insecticide used by the Pennsylvania Bureau of Forestry for gypsy moth suppression contains the bacteria *Bacillus thuringiensis* var. *kurstaki* (Btk). This insecticide must be ingested by the early instar larvae and is more effective on the first three instars of gypsy moth. There are several chemical insecticides that can be used for gypsy moth control. Diflubenzuron is an insect growth regulator that must be ingested by the caterpillar and acts on the juvenile stages of invertebrates by preventing the formation of a new exoskeleton when the organism molts. It is effective against gypsy moth larvae. Another insecticide used in forestry applications is tebufenozide, an insect growth regulator which causes a premature molt in the caterpillars of butterflies and moths that feed on foliage treated with the insecticide. There is a biological insecticide containing the nucleopolyhedrosis virus registered under the name GYPCHEK. Since this virus specifically attacks gypsy moth, GYPCHEK is used in areas where rare and endangered butterflies and moths are believed to be present. This insecticide is produced in limited amounts by the USDA Forest Service.

References

1. [Woody Ornamental Insect, Mite, and Disease Management](#)

For More Information

[Gypsy Moth in North America](#)
[PSU Ext Gypsy Moth Factsheet](#)
[Gypsy Moth USDA FS Forest Insect and Disease Leaflet 162](#)
[Gypsy Moth in Wisconsin / Biological Controls](#)
[Homeowner's Guide to Gypsy Moth Management](#)

For more information contact:

Division of Forest Pest
Management @ 717-783-2066

<http://www.dcnr.state.pa.us/forestry/insectsdisease/index.htm>



pennsylvania
DEPARTMENT OF CONSERVATION
AND NATURAL RESOURCES

APPENDIX B

BT Insecticide Information Bulletin

Bacillus thuringiensis Berliner (Bt) is a naturally occurring rod-shaped bacterium that causes disease in certain insect larvae. One variety of this organism affects the larvae of many moths and butterflies while other varieties affect fly and beetle larvae. Strains of the variety *kurstaki* are grown under controlled conditions and are then formulated into a biological insecticide for control of many forest and agricultural pests, including the gypsy moth (*Lymantria dispar*).

Formulations of Bt registered by EPA for gypsy moth control contain dormant bacterial spores along with crystals of a toxic protein, called delta-endotoxin, that the bacteria produce. Gypsy moth caterpillars (larvae) must eat these spores and crystals for the Bt to work. Once eaten, the crystals dissolve in the alkaline gut of the caterpillar and cause paralysis of the digestive system. Feeding usually ceases at this point. Cells in the gut wall then break down allowing dormant spores to invade the body cavity. If the caterpillar has not died by this time, the spores germinate and multiply in the body cavity causing a lethal infection. In small larvae the action of the crystal alone is usually fatal, but in larger larvae it is the later infection by the spores that causes death.

Successful gypsy moth control with any insecticide depends on proper spray timing, good spray weather, and thorough spray coverage. Because Bt is a living organism subject to mortality-causing factors such as desiccation and ultraviolet light, its residual effect is much shorter than most chemical insecticides. As a result, timing, weather, coverage, and population level are more critical for Bt than for chemicals. Under ideal conditions, Bt remains active on the foliage of treated trees for 7-14 days and will kill the caterpillars that ingest it. Unfortunately, conditions are not always ideal and, as a result, larval control with Bt averages below 80 percent. Therefore, when gypsy moth populations are healthy and building, a single application of Bt cannot be consistently relied upon to give population reduction and total nuisance abatement. However, if the user is willing to accept limited defoliation and the associated caterpillars, Bt normally provides foliage protection (70+ percent) adequate to reduce tree stress and related mortality. Plus, it will do this with the highest known degree of safety to human health and the environment of any insecticide currently on the market.

Many formulations of Bt are currently registered by the U. S. Environmental Protection Agency (EPA) for gypsy moth control and are sold under various trade names. FORAY® is one of the more common brands of Bt registered for use on forests and trees.

PENNSYLVANIA DEPARTMENT OF CONSERVATION & NATURAL RESOURCES
BUREAU OF FORESTRY
DIVISION OF FOREST PEST MANAGEMENT
400 Market Street, 6th Floor, P.O. Box 8552
Harrisburg, PA 17105-8552
(717) 783-2066

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